Hardware User's Manual

Automated 8-arm radial maze with photocells

References:
LE766(76-0231), LE768(76-0232)

Version:
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1. SYMBOLS TABLE

Recognising the symbols used in the manual will help to understand their meaning:

DESCRIPTION	SYMBOL
Warning about operations that must not be done because they can damage the equipment	
Warning about operations that must be done, otherwise the user can be exposed to a hazard.	
Protection terminal ground connection.	
Warning about a hot surface which temperature may exceed 65ºC	
Warning about a metal surface that can supply electrical shock when it's touched.	
Decontamination of equipment prior to disposal at the end of their operative life	
Waste Electrical and Electronic Equipment Directive (WEEE)	

2. GOOD LABORATORY PRACTICE

Check all units periodically and after periods of storage to ensure they are still fit for purpose. Investigate all failures which may indicate a need for service or repair.

Good laboratory practice recommends that the unit be periodically serviced to ensure the unit is suitable for purpose. You must follow preventive maintenance instructions. In case equipment has to be serviced you can arrange this through your distributor. Prior to Inspection, Servicing, Repair or Return of Laboratory Equipment the unit must be cleaned and decontaminated.

Decontamination prior to equipment disposal

In use this product may have been in contact with bio hazardous materials and might therefore carry infectious material. Before disposal the unit and accessories should all be thoroughly decontaminated according to your local environmental safety laws.

3. UNPACKING AND EQUIPMENT INSTALATION

WARNING: Failure to follow the instructions in this section may cause equipment faults or injury to the user.

A. Due to the dimensions of the structure of the maze, keep caution when assembling to avoid cuts and contusions.
B. Inspect the instrument for any signs of damage caused during transit. If any damage is discovered, do not use the instrument and report the problem to your supplier.
C. Ensure all transport locks are removed before use. The original packing has been especially designed to protect the instrument during transportation. It is therefore recommended to keep the original carton with its foam parts and accessories box for re-use in case of future shipments. Warranty claims are void if improper packing results in damage during transport.
D. Place the equipment on a flat surface and leave at least 10 cm of free space between the rear panel of the device and the wall. Never place the equipment in zones with vibration or direct sunlight.
E. Once the equipment is installed in the final place, the main power switch must be easily accessible.
F. Only use power cords that have been supplied with the equipment. In case that you have to replace them, the spare ones must have the same specs that the original ones.
G. Make sure that the AC voltage in the electrical network is the same as the voltage selected in the equipment. **Never connect the equipment to a power outlet with voltage outside these limits.**

WARNING

For electrical safety reasons you only can connect equipment to power outlets provided with earth connections .
This equipment can be used in installations with category II over-voltage according to the General Safety Rules.

The manufacturer accepts no responsibility for improper use of the equipment or the consequences of use other than that for which it has been designed.

PC Control

Some of these instruments are designed to be controlled from a PC. To preserve the integrity of the equipment it is essential that the attached PC itself conforms to basic safety and EMC standards and is set up in accordance with the manufacturers' instructions. If in doubt consult the information that came with your PC. In common with all computer operation the following safety precautions are advised.

WARNING

- To reduce the chance of eye strain, set up the PC display with the correct viewing position, free from glare and with appropriate brightness and contrast settings

- To reduce the chance of physical strain, set up the PC display, keyboard and mouse with correct ergonomic positioning, according to your local safety guidelines.

4. MAINTENANCE

WARNING: Failure to follow the instructions in this section may cause equipment fault.

- PRESS KEYS SOFTLY – Lightly pressing the keys is sufficient to activate them.
- Equipments do not require being disinfected, but cleaned for removing urine, faeces and odour. To do so, we recommend using a wet cloth or paper with soap (which has no strong odour). NEVER USE ABRASIVE PRODUCTS OR DISSOLVENTS.
- NEVER pour water or liquids on the equipment.
- Once you have finished using the equipment turn it off with the main switch. Clean and check the equipment so that it is in optimal condition for its next use.
- The user is only authorised to replace fuses with the specified type when necessary.

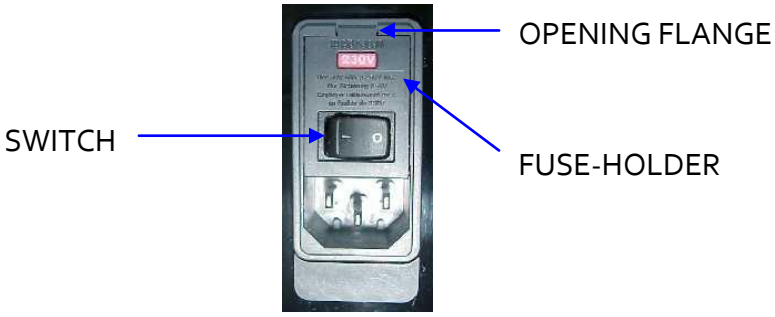


Figure 1. Power inlet, main switch and fuse holder.

FUSE REPLACEMENT

In case of an over-voltage or other incident in the AC net making it impossible to turn on the equipment, check fuses according to the following procedure.

1 Remove power cord from the power inlet

2 Open fuse-holder by pulling the flange with a regular screwdriver

Figure 2. Open fuse-holder door.

3 Extract fuse holder using the screwdriver.

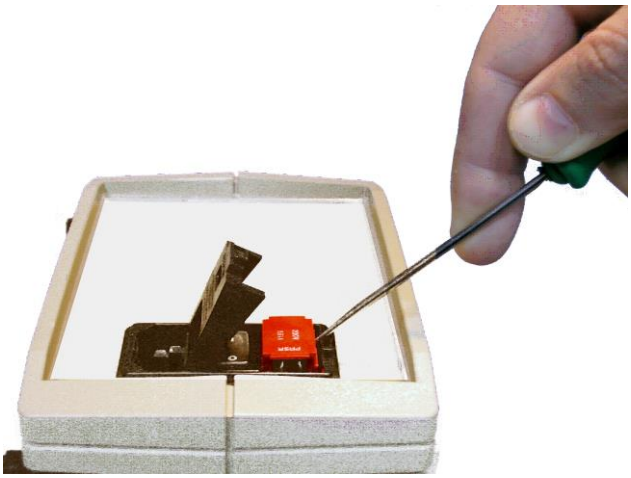
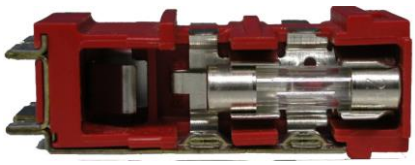


Figure 3. Extract fuse-holder.

4 Replace fuses if necessary. Insert fuses in the fuse-holder in the correct position.

CORRECT



INCORRECT

Figure 4. Fuses position.

5 Insert again fuse-holder, both possible positions are correct because power supply is universal.

6 If the fuses blow again unplug the equipment and contact technical service.

WARNING

For electrical safety, never open the equipment. The power supply has dangerous voltages.

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6. INTRODUCTION

Mazes are commonly used in neuroscience. An eight-arm radial maze makes it possible to study animal spatial memory.

The animal's position in an LE 766 LE 768 eight-arm radial maze is detected through infrared photocells in the arms, and a load cell in the centre.

Figure 5. LE 766 eight-arm radial maze.

There are two models of 8-arm automatic radial mazes:

CODE	ANIMAL	POSITION DETECTION
LE 766	Rat	Photoelectric cells + load cell
LE 768	Mouse	Photoelectric cells + load cell

Each arm in the radial maze has a door that is electrically controlled either in manual mode with a switch or in automatic mode with the **Mazesoft 8** software.

7. EQUIPMENT DESCRIPTION

7.1. CONTROL UNIT FRONT PANEL

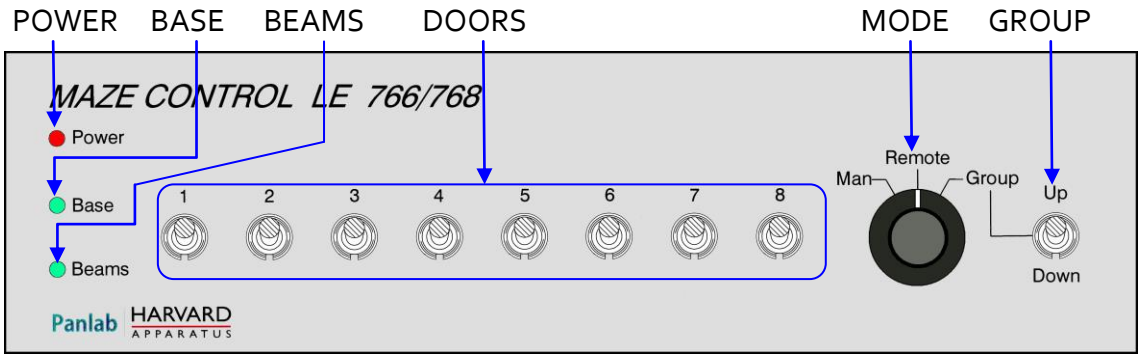


Figure 6. Front panel.

- **POWER:** This LED is on when the control unit is on.
- **BASE:** This LED is on while the animal is in the maze's centre.
- **BEAMS:** This LED remains on while an IR beam is cut by the animal.
- **MODE:** Mode of control of the doors:
  - **MAN:** Manual mode. In this mode the doors are controlled independently with the switches labelled 1 to 8.
  - **REMOTE:** Remote mode. In this mode the doors are controlled through the **Mazesoft 8** program and the door switches are disabled.
  - **GROUP:** Group mode. This mode allows opening or closing several doors simultaneously, the doors that belong to the **GROUP** must have their switch set in the upper position, then the control is done with the switch labelled GROUP.
- **DOORS:** The function of these switches changes depending the mode of operation:
  - **MAN:** Manual mode. In this mode if you raise the switch of door N this door will open, and if you lower the same switch this door will close.
  - **REMOTE:** Remote mode. In this mode the doors are controlled through the **Mazesoft 8** program and these switches are disabled.
  - **GROUP:** Group mode. The doors that belong to the group are selected by setting the switch in the upper position.
- **UP/DOWN:** This switch only is used in GROUP mode. It controls all the doors that belong to the group. In the upper position opens all the doors of the group, in the lower position closes all the doors of the group. The doors that do not belong to the group remain closed.

7.2. CONTROL UNIT REAR PANEL

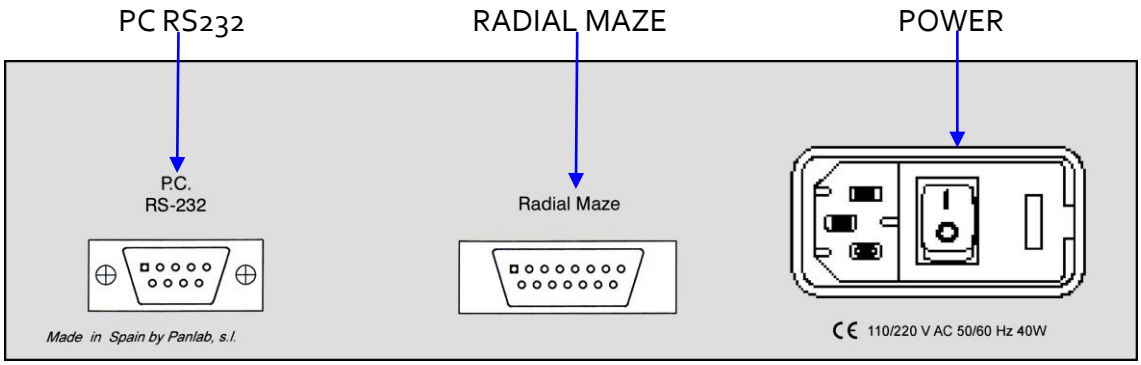


Figure 7. Rear panel.

- **PC RS232:** DB9 female connector used to connect the control unit to the computer serial port. The software **Mazesoft 8** shows animal position and is able to control doors when the control unit is set in REMOTE mode.

- **RADIAL MAZE:** DB15 female connector. The control unit is connected to the 8 arm maze through this connector. The information of IR cells and the central load cell is transmitted to the control unit so that the **Mazesoft 8** program is able to locate animal's position. The signal to open or close the doors is transmitted through this connector too.

- **POWER:** Power switch, fuse holder and power inlet.

7.3. MAZE

Figure 8. Eight-arm radial maze.

The radial automatic maze has 8 arms and a central area. Each arm has an automatic door. The animal's position is detected through photoelectric cells in the arms and a load cell in the central area. There is a cylindrical container for food at the end of each arm.

8. EQUIPMENT CONNECTION

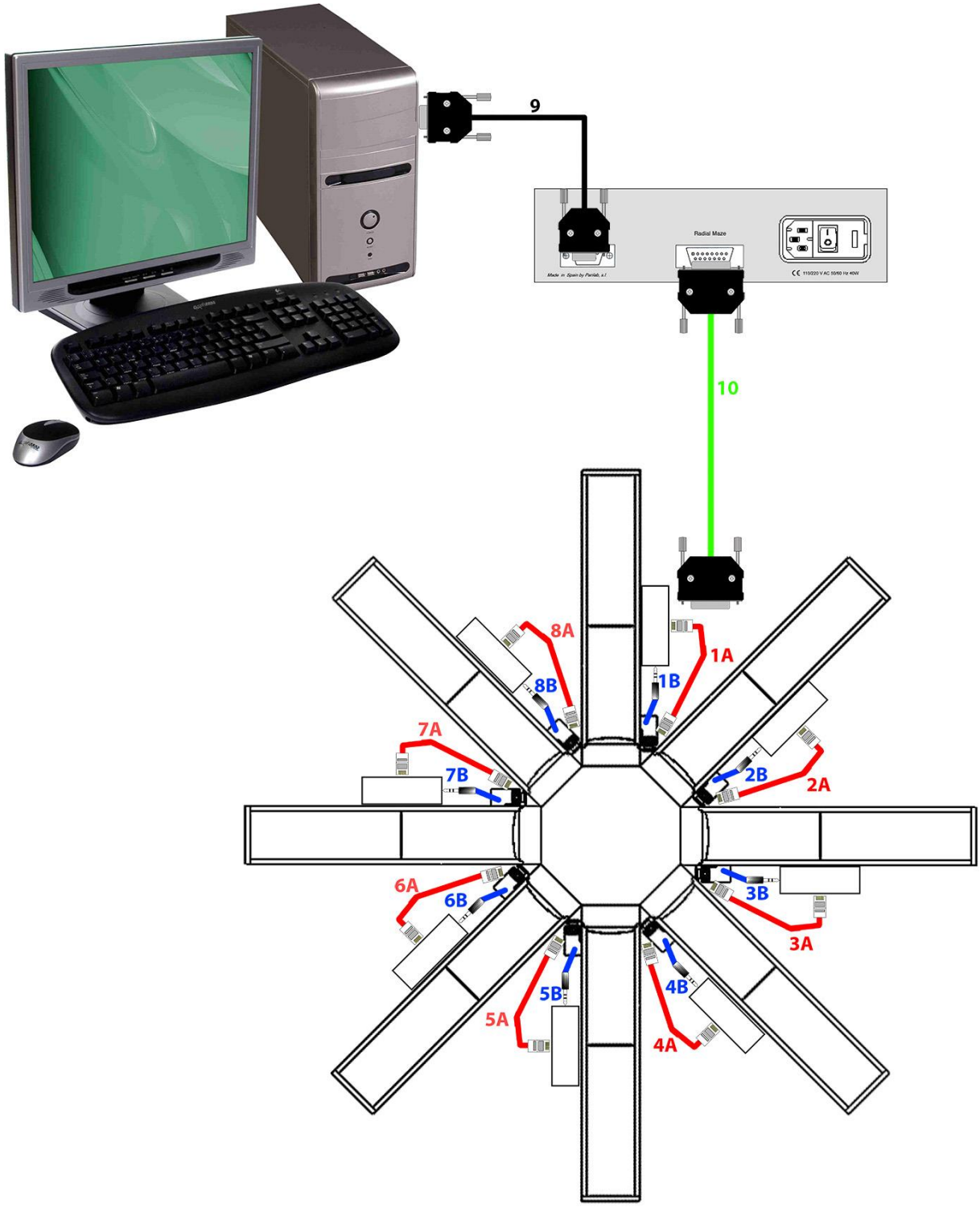


Figure 9. Equipment connection.

The necessary cables and connections are listed in the following table:

	FROM	TO	CABLE
1A	Arm 1	Maze's Platform	Telephonic
1B	Door 1	Arm 1	Jack stereo
2A	Arm 2	Maze's Platform	Telephonic
2B	Door 2	Arm 2	Jack stereo
3A	Arm 3	Maze's Platform	Telephonic
3B	Door 3	Arm 3	Jack stereo
4A	Arm 4	Maze's Platform	Telephonic
4B	Door 4	Arm 4	Jack stereo
5A	Arm 5	Maze's Platform	Telephonic
5B	Door 5	Arm 5	Jack stereo
6A	Arm 6	Maze's Platform	Telephonic
6B	Door 6	Arm 6	Jack stereo
7A	Arm 7	Maze's Platform	Telephonic
7B	Door 7	Arm 7	Jack stereo
8A	Arm 8	Maze's Platform	Telephonic
8B	Door 8	Arm 8	Jack stereo
9	Control unit RS232	Computer's serial port	DB9 to DB9
10	Control unit RADIAL MAZE	Maze's Platform	DB15 to DB15

9. MOUNTING THE RADIAL MAZE

1. Insert the structure arm into the circular base using the corresponding orifices.

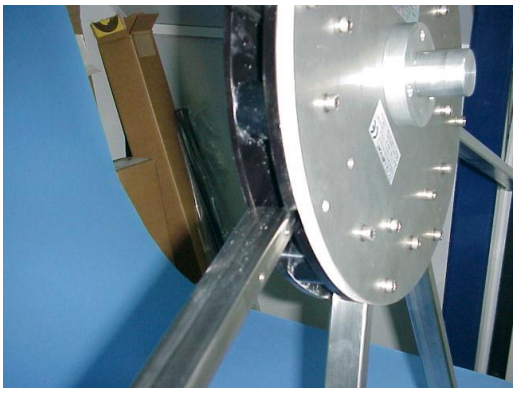


Figure 10. Inserting the arm in the circular base

2. Screw the Allen screws into the base to fix the structure arms.

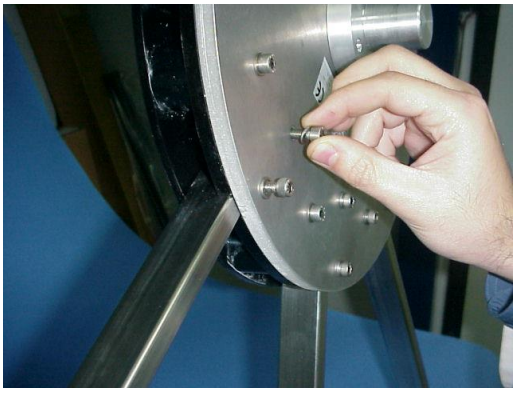


Figure 11. Screwing the Allen screws

3. Secure the screws with a hexagonal key.

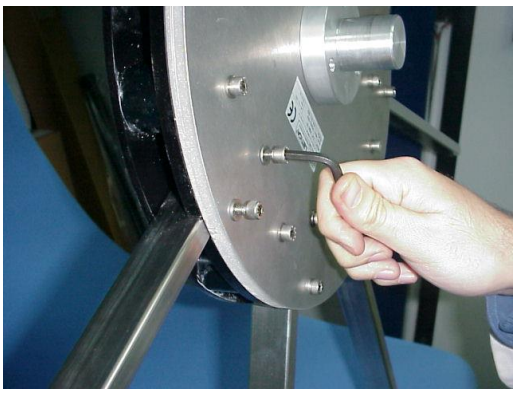


Figure 12. Securing the screws

4. Fit the platform with the 8 structure arms to the tripod.

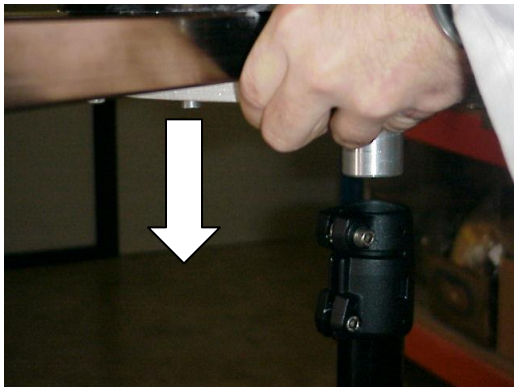


Figure 13. Placing the platform on the tripod.

5. Secure the platform to the tripod with a hexagonal key.

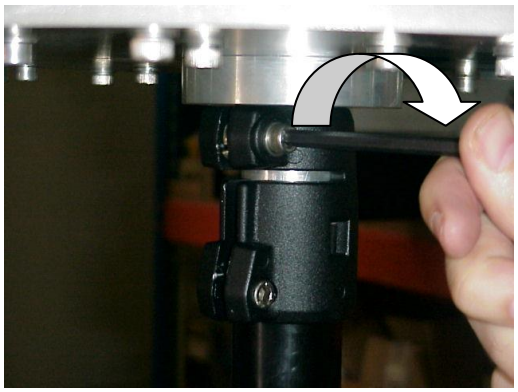


Figure 14. Securing the platform to the support.

6. Place the maze arm in the structure arm and push it until it reaches the central area.

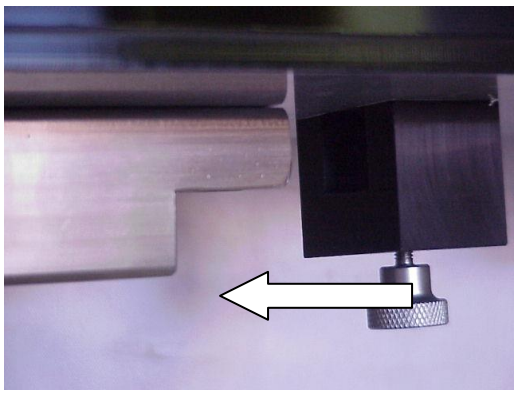


Figure 15. Placing the maze arm.

7. Secure the maze arm to the structure arm with the screw.

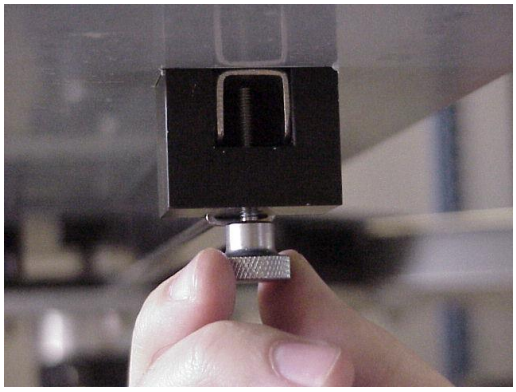


Figure 16. Securing the maze arm.

8. Affix the motor mechanism lid.

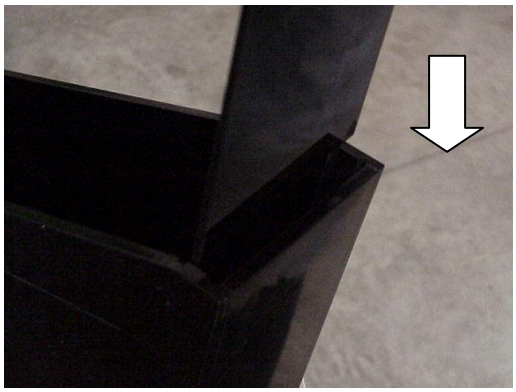
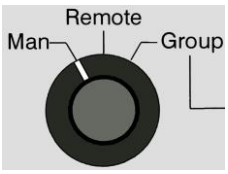


Figure 17. Introducing the maze arm sliding door.

10. WORKING WITH THE EQUIPMENT

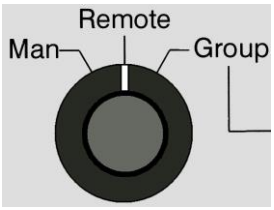
WARNING: Never place the animal in the centre of the maze, before turning on the control unit, otherwise the control unit will not be able to detect it. (When the control unit is turned on, it balances automatically the load cell)

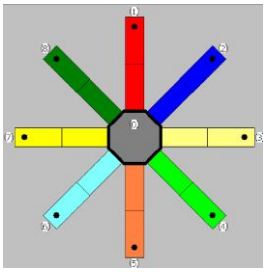
10.1. MANUAL MODE

1. Assembly the maze as it is explained in chapter 9.
2. Connect the cables as it is explained in chapter 8.
3. Turn on the control unit without the animal placed in the centre of the maze and the LED Power will remain on, the LEDS Base and Beams must be off.
4. Set the mode selector in the position 

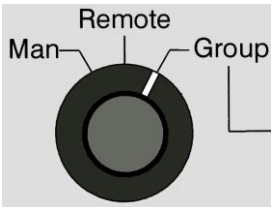
5. To raise the door of any arm raise the switch of this arm.
6. To lower the door of any arm, lower the switch of this arm.
7. Place doors in the initial state with the switches labelled from 1 to 8. (Normally they are closed).
8. Place the animal in the centre of the maze, then the LED Base will light up.
9. Open the doors by raising the switch depending on the needs of the experiment.
10. While the animal is in the centre of the maze the LED Base will stay on.
11. Every time that the animal cuts an IR beam the LED Beams will turn on.
12. Once the experiment ends remove the animal from the maze and clean it.
13. Return to step 7 to conduct a new experiment.

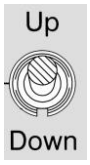
10.2. REMOTE MODE

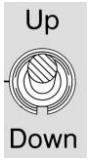
1. Assembly the maze as it is explained in chapter 9.
2. Connect the cables as it is explained in chapter 8.
3. Turn on the control unit without the animal placed in the centre of the maze and the LED Power will remain on, the LEDS Base and Beams must be off.
4. Set the mode selector in the position 

5. To raise and lower the doors you must use the buttons in the program **Mazesoft 8**.
6. Place the animal in the centre of the maze.
7. Follow **Mazesoft 8** instructions to conduct an experiment.
8. While the animal is in the centre of the maze the LED Base will stay on.
9. Every time that the animal cut an IR beam the LED Beams will turn on.
10. Animal position can be seen in the program **Mazesoft 8**. 
11. Once the experiment has ended remove the animal from the maze and clean it.
12. Return to step 5 to conduct a new experiment.

10.3. GROUP MODE

1. Assembly the maze as it is explained in chapter 9.
2. Connect the cables as it is explained in chapter 8.
3. Turn on the control unit without the animal placed in the centre of the maze and the LED Power will remain on, the LEDS Base and Beams must be off.
4. Set the mode selector in the position 

5. Select the doors you wish to control simultaneously by raising the switches labelled 1 to 8.
6. Place the GROUP switch 

in the DOWN position.
7. Place the animal in the centre of the maze, then the LED Base will turn on.
8. Raise the switch 

to the UP position in order to open the selected doors, the other doors will remain closed.
9. While the animal is in the centre of the maze the LED Base will stay on.
10. Every time that the animal cut an IR beam the LED Beams will turn on.
11. Once the experiment has ended remove the animal from the maze and clean it.
12. Return to step 7 to conduct a new experiment.

10.4. CLEANING PERSPEX

To clean the Perspex pieces you can use a slightly wet cloth and then dry them with a dry cloth. If they're too dirty you can wet the cloth with a soapy solution to clean them, then remove the foam with a wet cloth and finally dry them with a dry cloth.

WARNING: To clean Perspex parts never use alcohol or alcohol derived products, otherwise stripes will appear in the material.

10.5. CLEANING METALLIC PARTS

To clean the metallic parts you can use a slightly wet cloth and then dry them with a dry cloth. If they're too dirty you can wet the cloth with a soapy solution to clean them, then remove foam with a wet cloth and finally dry them with a dry cloth.

11. TROUBLESHOOTING

This table features instructions to solve the most frequent problems.

PROBLEM	SOLUTION
The equipment does not start up.	• Check the condition of the fuses.
Mazesoft 8 program is not detecting the position of the animal.	• Ensure that all cables are connected. • Check that control unit is turned on. • If you are using an USB to RS232 adapter check that drivers are correctly connected. • Check that the COM port you have selected in **Mazesoft 8** is the one where you have connected the control unit. • Check that **BASE** and **BEAMS** leds detect animal position.
Mazesoft 8 cannot control the doors.	• Ensure that all cables are connected. • Check that control unit is turned on. • Check that control unit is set in **REMOTE** mode. • If you are using an USB to RS232 adapter check that drivers are correctly connected. • Check that the COM port you have selected in **Mazesoft 8** is the one where you have connected the control unit.
One door does not open or closes.	• Check that the jack stereo cable is connected. • Check that there is not any mechanical blocking of the door.
Base LED is not detecting the animal	• Check that control unit was not turned on after placing animal in the base. • Check that base is not touching

	any place.
Base LED blinks.	• Check that the maze is connected to the control unit. • Load cell is damaged.

12. PREVENTIVE MAINTENANCE

	EXPERIMENT
CLEANING THE PERSPEX PARTS	☑
CLEANING THE METALLIC PARTS	☑
CHECK THE CONNECTIONS	☑

13. SPECIFICATIONS

POWER SUPPLY	
Input voltage:	Universal 100 Vac to 240 Vac
Frequency:	50 /60 Hz
Fuse:	2 fuses 5x20mm 2A 250V Fast
Maximum Power:	40 W
Conducted Noise:	EN55022 /CISPR22/CISPR16 class B
ENVIRONMENTAL CONDITIONS	
Operating Temperature:	10°C to +40°C
Operating Relative Humidity:	0% to 85% RH, non-condensing
Storage Temperature:	0°C to +50°C, non-condensing
POSITION DETECTION	
Rat:	30 gr
Mouse:	7 gr
DOOR	
Time open-closed:	1,1s
Regulation open:	Potentiometer P2
Regulation closed:	Potentiometer P1
DIMENSIONS (CONTROL UNIT)	
Width x Height x Depth:	230mm x 70mm x 280mm
Weight:	2.42 kg

DIMENSIONS (CAGE)[1]

MODEL	ANIMAL	ARM DIMENSIONS [Width x Height x Depth]	BASE [Diameter x Height]	DOOR [Height]	WALLS [Height]	TRIPOD [Height]
LE766	Rat	144x345x715	Ø 1249x114.5	90	From 294 to 41	850
LE768	Mice	357x201x102	Ø 616x116	50	From 150 to 26	850

[1] Dimensions are expressed in millimetres

DECLARACIÓN DE CONFORMIDAD
DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITÉ

Nombre del fabricante: Manufacturer's name: Nom du fabricant:	**Panlab s.l.u.** www.panlab.com info@panlab.com
Dirección del fabricante: Manufacturer's address: Adresse du fabricant:	Energía, 112 08940 Cornellà de Llobregat Barcelona SPAIN
Declara bajo su responsabilidad que el producto: Declares under his responsibility that the product: Déclare sous sa responsabilité que le produit:	**AUTOMATIC RADIAL MAZE**
Marca / Brand / Marque:	**PANLAB**
Modelo / Model / Modèle:	**LE 766 – LE 768**

Cumple los requisitos esenciales establecidos por la Unión Europea en las directivas siguientes:
Fulfils the essential requirements established by The European Union in the following directives:
Remplit les exigences essentielles établies pour l'Union Européenne selon les directives suivantes:

2006/95/EC	Directiva de baja tensión / Low Voltage / Basse tensión
2004/108/EC	Directiva EMC / EMC Directive / Directive CEM
2012/19/EU	La Directiva de Residuos de Aparatos Eléctricos y Electrónicos (WEEE) / The Waste Electrical and Electronic Equipment Directive (WEEE) / Les déchets d'équipements électriques et électroniques (WEEE)
2011/95/EC	Restricción de ciertas Sustancias Peligrosas en aparatos eléctricos y electrónicos (ROHS) / Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (ROHS) / Restriction de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques (ROHS)
2006/42/EC	Directiva mecánica / Machinery directive / Directive mécanique

Para su evaluación se han aplicado las normas armonizadas siguientes:
For its evaluation, the following harmonized standards were applied:
Pour son évaluation, nous avons appliqué les normes harmonisées suivantes:

Seguridad / Safety / Sécurité:	**EN61010-1:2010**
EMC:	**EN61326-1:2013 Class A**
Safety of machinery:	**EN ISO 12100:2010**

En consecuencia, este producto puede incorporar el marcado CE:
Consequently, this product can incorporate the CE marking:
En conséquence, ce produit peut incorporer le marquage CE:

CE

En representación del fabricante:
Manufacturer's representative:
En représentation du fabricant:

Carme Canalís
General Manager
Panlab s.l.u., a division of Harvard BioScience

Cornellà de Llobregat, Spain
30/04/2014

(GB) *Note on environmental protection:*

After the implementation of the European Directive 2002/96/EU in the national legal system, the following applies:
Electrical and electronic devices may not be disposed of with domestic waste.Consumers are obliged by law to return electrical and electronic devices at the end of their service lives to the public collecting points set up for this purpose or point of sale. Details to this are defined by the national law of the respective country. This symbol on the product, the instruction manual or the package indicates that a product is subject to these regulations. By recycling, reusing the materials or other forms of utilising old devices, you are making an important contribution to protecting our environment.

(E) *Nota sobre la protección medioambiental:*

Después de la puesta en marcha de la directiva Europea 2002/96/EU en el sistema legislativo nacional, Se aplicara lo siguiente:
Los aparatos eléctricos y electrónicos, así como pilas y baterías, no se deben tirar a la basura doméstica. El usuario está legalmente obligado a llevar los aparatos eléctricos y electrónicos, así como pilas y baterías, al final de su vida útil a los puntos de recogida municipales o devolverlos al lugar donde los adquirió. Los detalles quedaran definidos por la ley de cada país. El símbolo en el producto, en las instrucciones de uso o en el embalaje hace referencia a ello. Gracias al reciclaje, a la reutilización de materiales i a otras formas de reciclaje de aparatos usados, usted contribuirá de forma importante a la protección de nuestro medio ambiente.

(F) *Remarques concernant la protection de l'environnement :*

Conformément à la directive européenne 2002/96/CE, et afin d'atteindre un certain nombre d'objectifs en matière de protection de l'environnement, les règles suivantes doivent être appliquées.
Elles concernent les déchets d'équipement électriques et électroniques. Le pictogramme "picto" présent sur le produit, son manuel d'utilisation ou son emballage indique que le produit est soumis à cette réglementation. Le consommateur doit retourner le produit usager aux points de collecte prévus à cet effet. Il peut aussi le remettre à un revendeur.En permettant enfin le recyclage des produits, le consommateur contribuera à la protection de notre environnement. C'est un acte écologique.

(D) *Hinweis zum Umweltschutz:*

Ab dem Zeitpunkt der Umsetzung der europäischen Richtlinie 2002/96/EU in nationales Recht gilt folgendes:
Elektrische und elektronische Geräte dürfen nicht mit dem Hausmüll entsorgt werden. Der Verbraucher ist gesetzlich verpflichtet, elektrische und elektronische Geräte am Ende ihrer Lebensdauer an den dafür eingerichteten, öffentlichen Sammelstellen oder an die Verkaufstelle zurückzugeben. Einzelheiten dazu regelt das jeweilige Landesrecht. Das Symbol auf dem Produkt, der Gebrauchsanleitung oder der Verpackung weist auf diese Bestimmungen hin. Mit der Wiederverwertung, der stofflichen Verwertung oder anderer Formen der Verwertung von Altgeräten leisten Sie einen wichtigen Beitrag zum Schutz unserer Umwelt.

(I) *Informazioni per protezione ambientale:*

Dopo l'implementazione della Direttiva Europea 2002/96/EU nel sistema legale nazionale, ci sono le seguenti applicazioni:
I dispositivi elettrici ed elettronici non devono essere considerati rifiuti domestici. I consumatori sono obbligati dalla legge a restituire I dispositivi elettrici ed elettronici alla fine della loro vita utile ai punti di raccolta collerici preposti per questo scopo o nei punti vendita. Dettagli di quanto riportato sono definiti dalle leggi nazionali di ogni stato. Questo simbolo sul prodotto, sul manuale d'istruzioni o sull'imballo indicano che questo prodotto è soggetto a queste regole. Dal riciclo, e re-utilizzo del material o altre forme di utilizzo di dispositivi obsoleti, voi renderete un importante contributo alla protezione dell'ambiente.

(P) *Nota em Protecção Ambiental:*

Após a implementação da directiva comunitária 2002/96/EU no sistema legal nacional, o seguinte aplica-se:
Todos os aparelhos eléctricos e electrónicos não podem ser despejados juntamente com o lixo doméstico Consumidores estão obrigados por lei a colocar os aparelhos eléctricos e electrónicos sem uso em locais públicos especficos para este efeito ou no ponto de venda. Os detalhes para este processo são definidos por lei pelos respectivos países. Este símbolo no produto, o manual de instruções ou a embalagem indicam que o produto está sujeito a estes regulamentos. Reciclando, reutilizando os materiais dos seus velhos aparelhos, esta a fazer uma enorme contribuição para a protecção do ambiente.